

# National Bureau of Standards

## Certificate

### Standard Reference Material 774

#### Lead-Silica Glass for Dielectric Constant and ac Loss Characteristics

M. J. Cellarosi

This Standard Reference Material is intended for use in checking test methods used to determine the dielectric constant and associated dissipation factor of insulating materials. It is in the form of a block approximately 5 cm square by 2.5 cm thick from which several specimens can be cut.

The certified values for the dielectric constants and associated dissipation factors, (loss tangents) at room temperature and relative humidity not exceeding 55 percent are:

Frequency	Dielectric Constant	Dissipation Factor
60 Hz	(7.47)*	$(940)^* \times 10^{-6}$
100	7.47	675
400	7.47	643
1000	7.46	622
10000	7.45	570

\*Because of the lack of agreement between the cooperating laboratories, this value is not certified but is for information only.

The uncertainties of the dielectric constants and the dissipation factors (each expressed as the standard deviation,  $l_s$ ) are 0.05 and 31, respectively. Included in these uncertainties are possible specimen inhomogeneities, preparation of specimens, and measurement errors.

The technical and support aspects involved in the preparation, certification, and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by R.K. Kirby.

Washington, D.C. 20234  
July 19, 1982

George A. Uriano, Chief  
Office of Standard Reference Materials

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The interlaboratory comparison measurements leading to certification were performed under the auspices of ASTM Subcommittee C-14.04 on Physical and Mechanical Properties of Glass, H.E. Hagy, Chairman. The laboratories that cooperated in these measurements are:

National Bureau of Standards, Washington, D.C.; M.J. Cellarosi  
 Owens-Corning Fiberglas Corp., Granville, OH; J.R. Gontierman  
 Owens-Illinois, Inc., Toledo, OH; R.W. Beiswenger  
 Rensselaer Polytechnic Institute, Troy, NY; M. Tomozawa  
 The test specimens measured at NBS were nominally 40 mm in diameter and 1 mm thick. The opposite faces were optically polished to be parallel to 5  $\mu\text{m}$ . Gold was vacuum deposited to form the electrodes. The three-terminal method was used in which the diameter of the guarded electrode was 25 mm and the gap was 1 mm resulting in a capacitance of about 33 pF. Measurements were made with a low-voltage bridge in accordance with ASTM D150. Standard Test Methods for A-C Loss Characteristics and Dielectric Constant (Permittivity) of Solid Electrical Insulating Materials.

Content	Constituent	SiO <sub>2</sub> (46.0) wt %	PbO (45.3)	K <sub>2</sub> O (5.6)	Na <sub>2</sub> O (2.5)	H <sub>2</sub> O <sub>3</sub> (0.6)	Index of Refraction
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$$n_D = (1.618)$$

The nominal composition and index of refraction for the sodium D line of this SRM are offered for information only:

## SUPPLEMENTARY INFORMATION